

What is claimed is:

1. A negative electrode of a lithium battery comprising a lithium metal, and a protective layer formed on the lithium metal, wherein the protective layer comprises a material having an ion conductivity greater than or equal to 5×10^{-5} S/cm.
2. The negative electrode of the lithium battery according to claim 1, wherein the protective layer comprises a material having the ion conductivity greater than or equal to 1×10^{-4} S/cm.
3. The negative electrode of the lithium battery according to claim 1, wherein the protective layer comprises a material having the ion conductivity greater than or equal to 1×10^{-3} S/cm.
4. The negative electrode of the lithium battery according to claim 1, wherein the material comprising the protective layer comprises a crystalline material.
5. The negative electrode of the lithium battery according to claim 4, wherein the material comprising the protective layer is selected from the group consisting of an oxide, nitride, oxynitride, sulfide, oxysulfide, and halonitride.
6. The negative electrode of the lithium battery according to claim 5, wherein the material comprising the protective layer is selected from the group consisting of Li_3N , LiAlCl_4 , $\text{Li}_9\text{N}_2\text{Cl}_3$, $\text{Li}_{9-x}\text{Na}_x\text{N}_2\text{Cl}_3$, $\text{Li}_{9-x}\text{K}_x\text{N}_2\text{Cl}_3$, $\text{Li}_{9-x}\text{Rb}_x\text{N}_2\text{Cl}_3$, $\text{Li}_{9-x}\text{Cs}_x\text{N}_2\text{Cl}_3$, $3\text{Li}_3\text{N-LiI}$, $3\text{Li}_3\text{N-NaI}$, $3\text{Li}_3\text{N-KI}$, and $3\text{Li}_3\text{N-RbI}$ (wherein $0 < x < 9$).
7. The negative electrode of the lithium battery according to claim 1, wherein the protective layer has a thickness between 500 \AA and $5 \text{ }\mu\text{m}$.
8. The negative electrode of the lithium battery according to claim 1, wherein the protective layer has an average surface roughness less than or equal to 5000 \AA .

9. The negative electrode of the lithium battery according to claim 1, wherein the lithium metal one selected from the group consisting of a lithium foil, lithium deposited on a resin film base material and a metal-deposited resin film base material.

10. A method of preparing a negative electrode of a lithium battery, comprising :
depositing lithium on a surface of lithium metal under an atmosphere of at least one gas selected from the group consisting of nitrogen, oxygen, chlorine, carbon monoxide, carbon dioxide, and sulfur dioxide to provide a protective layer comprising a material having an ionic conductivity greater than or equal to 5×10^{-5} S/cm.

11. The method of preparing the negative electrode of the lithium battery according to claim 10, wherein the material comprising the protective layer is a crystalline material.

12. The method of preparing the negative electrode of the lithium battery according to claim 10, wherein the lithium deposition is carried out by a process selected from the group consisting of sputtering, ion beam sputtering, electron beam evaporation, vacuum thermal evaporation, laser ablation, chemical vapor deposition, thermal evaporation, plasma chemical vapor deposition, laser chemical vapor deposition, and jet vapor deposition.

13. The method of preparing the negative electrode of the lithium battery according to claim 10, further comprising accelerating an ion beam upon depositing the lithium.

14. The method of preparing the negative electrode of the lithium battery according to claim 10, wherein the protective layer comprises a material having the ion conductivity greater than or equal to 1×10^{-4} S/cm.

15. The method of preparing the negative electrode of the lithium battery according to claim 14, wherein the protective layer comprises a material having the ion conductivity greater than or equal to 1×10^{-3} S/cm.

16. The method of preparing the negative electrode of the lithium battery according to claim 10, wherein the material composing the protective material is selected from the group consisting of an oxide, nitride, oxynitride, sulfide, oxysulfide, and halonitride.

17. The method of preparing the negative electrode of the lithium battery according to claim 10, wherein the material composing the protective layer is selected from the group consisting of Li_3N , LiAlCl_4 , $\text{Li}_9\text{N}_2\text{Cl}_3$, $\text{Li}_{9-x}\text{Na}_x\text{N}_2\text{Cl}_3$, $\text{Li}_{9-x}\text{K}_x\text{N}_2\text{Cl}_3$, $\text{Li}_{9-x}\text{Rb}_x\text{N}_2\text{Cl}_3$, $\text{Li}_{9-x}\text{Cs}_x\text{N}_2\text{Cl}_3$, $3\text{Li}_3\text{N-LiI}$, $3\text{Li}_3\text{N-NaI}$, $3\text{Li}_3\text{N-KI}$, and $3\text{Li}_3\text{N-RbI}$ (wherein $0 < x < 9$).
18. The method of preparing the negative electrode of the lithium battery according to claim 10, wherein the protective layer has a thickness between 500 \AA and $5 \text{ }\mu\text{m}$.
19. The method of preparing the negative electrode of the lithium battery according to claim 10, wherein the protective layer has an average surface roughness less than or equal to 5000 \AA .
20. The method of preparing the negative electrode of the lithium battery according to claim 10, wherein the lithium metal comprises one selected from the group consisting of a lithium foil, lithium deposited on a resin film base material and a metal-deposited resin film base material.
21. A lithium battery comprising a negative electrode comprising a lithium metal, and a protective layer formed on the lithium metal, wherein the protective layer comprises a material having an ion conductivity greater than or equal to $5 \times 10^{-5} \text{ S/cm}$.
22. The lithium battery according to claim 21, wherein the lithium battery is a lithium-sulfur battery.
23. A lithium battery comprising the negative electrode prepared by depositing lithium on a surface of lithium metal under an atmosphere of at least one gas selected from the group consisting of nitrogen, oxygen, chlorine, carbon monoxide, carbon dioxide, and sulfur dioxide to provide a protective layer comprising a material having an ionic conductivity greater than or equal to $5 \times 10^{-5} \text{ S/cm}$.

24. The lithium battery according to claim 23, wherein the lithium battery is a lithium-sulfur battery.